

Remarks

By this response, claim 13 has been amended. No new matter has been entered as support for the amendments is provided for by the specification, claims, and drawings as originally filed, specifically support is found on page 14, paragraph [0041] and Fig 4, elements 412, 410 and 304. Accordingly, claims 13-27, 29-32, 35 and 41 are pending in this application.

Claim Rejections - 35 USC § 103

Claims 13-22, 31 and 41 are rejected as being unpatentable over Grehier et al (US 4,037,023) in view of McLean (US 6,544,681). Applicants respectfully traverse.

Claim 13 recites a device comprising an electrochemical cell comprising a membrane electrode assembly defining an anode side of said cell and a cathode side of said cell. The cell also comprises a first flow field plate for the cathode side of the cell. The first flow field plate comprising a plurality of first channels separated by first lands wherein the plurality of first channels and first lands run between a first set of fluid manifolds. Further the cell comprises a second flow field plate for the anode side of said cell. The second flow field plate comprising a plurality of second channels separated by second lands wherein the plurality of second channels and second lands run between a second set of fluid manifolds. The membrane electrode assembly is interposed between the first and second flow field plates. A pitch is defined by the first flow field plate is less than a pitch defined by the second flow field plate. At least one of the first lands and at least one of the second lands are each provided in a pattern of alternating angles and crests in a plane parallel to both of the flow field plates. The pattern of the first lands and the pattern of the second lands are orientated relative to each other across the membrane electrode assembly such that the first and second lands crisscross along the alternating angles and overlap on the crests. The plurality of first lands align with the plurality of second land and do not align with the plurality of second channels. The pitch of each the first and second flow field plates is constant between the first and second sets of fluid manifolds.

Grehier discloses a fuel cell formed from a stack of electrodes. However, in Grehier, the formed parts are the electrodes (Col. 2, lines 39-41), while in the claimed invention, it is flow field plates that are formed. Additionally, in Grehier, the electrode pattern formations are used to support a flow passage (Col. 2, lines 46-54; Col. 4, lines 9-17 and lines 57-62) of liquid electrolyte (Col. 1, lines 52-57; Col. 4, lines 9-17) or reactants (Col. 2, lines 46-48; Col. 4, lines

59-62). In contrast, in the claimed invention, a solid electrolyte is used and the offset pattern of the lands and channels of the flow field plates is used to avoid nesting of channels across the MEA. In other words, the protrusions of the two flow fluid plates, in the claimed invention, are offset across an MEA. Further, Grehier fails to disclose flow field plates where a first flow field plate has a different pitch than a second flow field plate and where the lands and channels of the flow field plates align in a wiggle pattern on opposite sides of a MEA.

Examiner admits Grehier fails to teach that a pitch defined by one flow field plate is greater than a pitch of the other, or any details outlined in the above listed dependent claims with regards to the pitch and the cross-sectional dimensions, or that the fuel cell is a proton exchange membrane fuel cell and cites McLean. However, McLean fails to remedy the deficiencies of Grehier. McLean discloses a double sided corrugated flow field plate for use in fuel cells. However, McLean fails to teach flow field plates with different pitches in which the plurality of narrow first lands align with the plurality of wider second lands and do not align with the plurality of second channels. In McLean, the use of bi-polar plate flow plates with different pitches, as shown in Fig. 3, would result in the narrow lands (element 36 in Fig. 3) aligned with channels across the MEA resulting in the MEA shearing as the lands nested into the channels in plates across the MEA. In contrast, in the claimed invention, the out-of-phase angle (wiggle) pattern across the MEA helps eliminate the nesting problem and the shearing of the MEA. Therefore, neither Grehier nor McLean disclose these limitations in the claimed invention.

Nor does the hypothetical combination of Grehier and McLean suggest or teach flow field plates with different pitches in which the plurality of narrow first lands align with the plurality of wider second lands and do not align with the plurality of second channels. Because the hypothetical combination of Grehier and McLean does not suggest or teach all the limitations of the claimed invention, Applicants believe that claim 13 is patentable over the prior art and request the Examiner withdraw his rejection to claim 13.

Claims 14-22, 31 and 41 depend from the independent claims 13 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claim from which they depend. Therefore, Applicants assert that claims 14-22, 31 and 41 are also patentable over the prior art and request that the Examiner withdraw his rejection thereof.

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Claims 23-27, 29, 30, 32 and 35 are rejected as being unpatentable over Grehier et al in view of McLean as applied to claim 13 above, and further in view of Suzuki (US 2002/0004158). Applicants respectfully traverse.

Claims 23-27, 29, 30, 32 and 35 depend from the independent claim 13 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claim from which they depend. Therefore, Applicants assert that claims 23-27, 29, 30, 32 and 35 are also patentable over the prior art and request that the Examiner withdraw his rejection thereof.

Conclusion

In view of the above amendments and remarks, Applicants respectfully submit that the present application is in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
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